Internal fixation of equine fractures has advanced over the last few decades primarily because of the improving expertise of practicing surgeons and correct application of implants according to proven mechanical principles. The unfortunate reality of fracture repair in horses, however, is that failures still occur commonly because of infection, delayed union and implant failure. Delayed union in species other than the horse is a lesser issue because the consequences of severe lameness and overload of the contralateral limb are less and the expectations for return to function are usually lower. In horses, we still generally recognize that immediate comfort (i.e. stability) is an important element of successful fracture repair and that delayed union is a major complication because of implant failure and contralateral limb problems. Equine surgeons have naturally tended towards aggressive open fracture repairs in order to minimize mechanical “errors” that might reduce stability. Arthroscopy and fluoroscopy/intraoperative digital radiography are already routine adjuncts to many internal fixation procedures but intraoperative CT has enormous potential to minimize the errors that are inherently more likely with minimally invasive techniques.

In particular, CT is especially valuable in complex fractures that are difficult to “figure out” from plane films (e.g. comminuted P1), fractures that do not allow adequate fluoroscopic projections that can assure accurate screw placement (e.g. tarsal slab fractures) and bones with a complete lack of direct exposure (P3 and navicular).

Our greatest specific experience with CT guided fixations are probably within the hoof but the same principles apply when using the CT for intraoperative guidance in other types of fractures or arthrodeses. Use a skin marker to help define the intended site of implant insertion. Use a skin marker on the extended line for the drill bit. Take post-insertion CT to triple check placement.

CT assistance is certainly not “essential” for most fractures but it provides one more level of guidance to help assure accurate fixations. Although the machine used in these cases (CereTom made by NeuroLogica Corporation, Danvers MA) has limitations because of its size, the portability of the unit and its speed make it very practical for intraoperative use in the distal limb of horses.
Figure 2: Computed tomography can also help accurate placement of screws in small fractures in locations such as the distal tarsal bones where tangential views are unavailable. A- Scintigraphic study showing focal intense radiopharmaceutical uptake in dorsolateral T3. B- DMPLO radiograph demonstrating displaced slab fracture of T3. C- Barium paste blebs and/or steel staples can be used as skin markers to help define the exact center of the fracture fragment. D- Postoperative CT showing exact central placement within the small fragment. E- Postoperative DMPLO projection. F- The fracture was radiographically healed in less than 90 days.
Figure 3: Dorsopalmar (A) and palmar tangential (B) views of an acute navicular bone fracture in an 11 year old Thoroughbred gelding. In (C)-a 2.0 mm hole is made to check drill placement. (D)-A 3.5 mm glide hole is made to the fracture plane. (E)- The 2.5 mm thread hole is continued through the larger fragment of the navicular bone. (F)- The final placement of the 3.5 mm screw. Orthogonal dorsopalmar (G) and lateromedial (H) projections confirm central placement of the screw.